4:Grajdanzev--5-6 S-4 (no date) 1942 Formosans
116, 132, 137

"Situated as it is in the tropics, Taiwan has high temperatures with small variations from year to year, and relatively small fluctuations from month to month.

Average Yearly Temperatures In Taiwan At Sea Level

	Centigrade			Fahrenheit		
	1931	1932	1936	1931	1932	1936
Taihoku (north)	21.6	21.6	21.7	70.9	71.9	71.2
Taichu (middle)	22.1	22.1	22.1	71.8	71.8	71.8
Koshun (south)	24.3	24.3	24.4	75.7	75.7	75.9

Source: Japan-Manchoukuo Year Book and Taiwan Jijo.

The average annual temperature in Manila is 26.6°C. and in Hongkong 22.2°C. January temperature in Koshun is a little above that of Miami, Florida, and the July temperature is the same. Taiwan at low levels thus resembles Florida and is considerably warmer than California. Tropical fruits can [6] ripen in Taiwan and it is possible to raise two crops of rice from the same field and in some cases to grow a third crop also, usually of some vegetable. Land may be used much more intensively than in Japan. Frost is very rare in Taiwan (2) while snow is unknown, even on the mountains.

2. The lowest temperature observed was -0.2 C (31.6 F) at Taihoku and -0.1 C (31.8 F) at Taichu."

4:Grajdanzev--8 [2] S-4 (no date) 1942 Formosans
116, 137

"The vegetation is luxuriant and tropical in character. The island is rich in sweet-scented and bright flowers, especially orchids, while in its forests one may see banana, black ebony, camphor oak, maple, palm, cork, oak, tree ferns, persimmons, pineapples, soap trees, tallow trees, etc. Higher in the mountains are found gigantic cryptomeria, red cedar, spruces, hinoki (Thuya obtusa), and pines; still higher the trees give place to short grass."

"The present distribution of forests and waste lands (i.e. formerly forest or which can be afforested) may be seen from the following table:

Forest Area in Taiwan, December 1936
(1,000 ko)

	On the plains	In the aborigines' territory	Total
State: forests	399,086	1,312,562	1,711,648
waste land	195,529	308,137	503,666
Public: forests	12,112	...	12,112
waste land	3,529	...	3,529
Private: forests	219,095	1,568	220,663
waste land	45,131	...	45,131
Total: forests	630,293	1,314,130	1,944,423
waste land	244,189	308,137	552,326

The Japan Year Book say: 'Reckless cutting of trees was done by Chinese immigrants and this . . . resulted in the devastation of forest districts.' But it is surprising to find that the forest area on the plains (excluding waste land) is about three-quarters of the area under cultivation. However, the exploitation of this tremendous area — 2,496,749 ko or about 5.8 million acres — leaves much to be desired. According to official

statistics. the total value of forest products in 1936 was only ¥15.1 million—much less than the value of fishery products or only two per cent of the gross value of the island's production. This sum was made up of the following items: [89] timber, ¥5.6 million; charcoal. 1.9 million; bamboo, 1.7 million; [illegible]wood, 2.7 million; and others 3.2 million. If these figures are correct, then of the 2,496,749 ko, one ko brings on the average only six yen, or less than half that in Japan."

6: Kirchhoff--28 [2] U-4 (no date) 1895 Formosans
116, 137

In general the flora of Taiwan is related to that of the Indo-Malayan region, and more distantly probably also to that of South China. Formosa is an evergreen land, the generally warm and humid air in the mountains feeding a thicket that can be penetrated only with difficulty; it is a land of palms, tree ferns and bamboo. The banana, i. e. the Musa textilis of the Philippines (Hosie, p. 6), thrives in the south at least, and also the Pandang, quite a number of tropical fruit trees, the climbing palm Calamus Draco, which festoons the thickets of the east in particular, and the betel-nut palm, both of them being found in the Malayan Archipelago and on Hainan, but the latter being unknown on the Chinese mainland (Hosie, pp. 5 ff). Even round the Dragon Lake one can see lofty palms raise their feathery crests; but the king of the Formosa forests is the camphor tree (Cinnamomun Camphora) with its imposing, oak-like form and its shiny, dark green leaves. In addition to this no fewer than 65 various species of building wood are counted in the forests. Indigenous are also the important fiber plant Boehmeria nivea, the so-called China nettle, a near relative of our stinging nettle, and the beautiful Araliacee Fatsia papyrifera, whose stem turns into wood and grows to the height of a man within one year, and which bears a chain of long-stalked leaves on its crest divided like hands, and whose unusually plentiful pith provides the valuable material for the manufacture of Chinese pith paper (incorrectly called rice paper).

6: Kirchhoff--32 [2] U-4 (no date) 1895 Formosans
116, 137, 241

As well as indigo, there are grown ginger and plants providing oil, both sesame and peanuts (Arachis hypogaea), and also melons, pineapple, bananas and the South Asiatic tree fruits such as mango and the giant lemons or grapefruit (Citrus decumanus). The Chinese nettle (Su-mo in Chinese) need not be planted any more than the Fatsia papyrifera, since it grows wild in abundance, the latter especially on the mountains round Tam-sui.

9: Yamasaki--231 [3] N-5 (1896-1897) 1900 Formosans
116, 137, 313, 342, 501

As the name of Formosa shows, we find all over the island very heavy tropical vegetation.

Bamboo. This grows everywhere on inhabited plains and hills. The useful species become much thicker and larger than in Japan. It is used for many purposes. In the mountains the inhabitants build their huts of it, and in South Taiwan the fishermen build of it their boats and Teppai or Takamalan. These latter are curious sailing boats with raft-like bottoms of bamboo stems laid beside each other.

9: Yamasaki--231 [4] N-5 (1896-1897) 1900 Formosans
116, 137, 276

The betel-nut palm (Areca Catechu L.) is a common tree in the plains. Especially in South Taiwan it is planted in gardens. Slices of the fruit mixed with slaked lime and leaves of the betel-pepper are used on Taiwan, by both Malays and Chinese, as a stimulus and offer an agreeable refreshment, when placed in the mouth.

Ficus retusa L. and Ficus Wightiana Wall, are also found extensively on the island. In one pass between Teroso and Hachiyowan in South Taiwan I saw a dense wood of Ficus retusa, together with Calamus Rotang L., much intertwined. The first mentioned species of fig, with its far-spread aerial roots, also grows much on the tongue of land near Takao. Pan dangs (Pandanus odoratissima) is found extensively in the plain, particularly in the region of the coast. The tree fern (Cyathea spinulosa) is also found all over the island. The coniferous type of tree ends in North Taiwan. Here, as far as the Hachimantōge on the Hokkō-kei, there are still found beautiful woods of a pine very similar to the Japanese Pinus densiflora. One often encounters Acacia Rhichii in the woods and fields and along the routes. At first glance, from a little distance, it looks like an osier. The coral tree (Erythrina indica L.) flourishes in the plains. In general the primeval forests in the mountain ranges of Taiwan are very dense and impenetrable. Most trees are covered by uncountable varieties of parasites and various climbing plants wind around them. Where there are no trees there is a brush consisting of bamboo, banana palms or tree ferns. In clear patches, there are grass bushes of Kaya (Eulalia and Imperata species) over 3 m. high, which are often so thick that it is difficult to traverse them. In lagoons near Takao one finds the mangrove woods so typical of tropical regions.

9: Yamasaki--231 [6] N-5 (1896-1897) 1900 Formosans 116, 137

Concerning the flora of the woods, Dr. S. Honda, who climbed the highest mountain, Niitaka-yama, has made the following important observations:*

*Mitteilungen der deutschen Gesellschaft für Natur-und Völkerkunde Ostasiens in Tokio. Vol. VI, No. 60, July 1897.

"The Formosan lowland belongs, from sea level to a height of 1,700 feet (520 m.), to the area of tropical vegetation, and consists chiefly of Ficus, Pandanus, palms and pineapple. From here up to 6,000 feet (1,830 m.) there extends a sub-tropical evergreen forest, the camphor tree being found up to a height of 6,500 feet (1,980 m.); in addition we find evergreen oak species. From 6,000 feet (1,830 m.) there begins the coniferous region, first of all with Cryptomeria and Chamäcyparis and then, between 7,000 and 8,500 feet (2,130 to 2,590 m.), with pines (a variety of Picea Glehni), between 8,500 and 10,500 feet (2,590 to 3,200 m.) with Tsuga (Tsuga diversifolia Max.) and finally, from 10,500 feet up to the peak of the Morrison (3,200 to 4,145 m.) with species of fir and juniper, and chiefly Abies Menziezii."

9: Yamasaki--232 [7] N-5 (1896-1897) 1900 Formosans
116, 137

Many species of edible fruits are found. Bananas (Musa chinensis) are found everywhere. Pineapple (Ananassa sativa Mill.), Euphoria longa, Mangifera, are tasty tropical fruits. Among the Citrus genus the large Citrus decumana L. (Yua) plays the chief part, C. nobilis and C. medica being also found. I have seen persimmon (Diospyros kaki) in the aboriginal village of Hōgō in the Central chain.

9: Yamasaki--232 [8] N-5 (1896-1897) 1900 Formosans
116, 137, 248, 286

The pineapple (Hōri or Unrai) is an important plant for Taiwan, not only for its fruit, but also because the leaves have fine fibers from which thin summer clothing is woven. The fine cloth used for this is called Unrai-pu or "pineapple cloth." The most important textile plant of the island is, however, the China-grass (Boehmeria nivea Hook.), Tschumā in Chinese and Karamushi in Japanese, its fibers being exported in large quantities. It is also one of the chief articles of barter for the aborigines in the mountains. In Holisha I saw a large quantity of China-grass fibers, which had been taken there by the natives living on the upper course of the Dakusui-kei.

9: Yamasaki--232 [9] N-5 (1896-1897) 1900 Formosans
116, 137, 289

A curious and noteworthy plant growing on the island is the Fatsia papyri fera Miq. (Tsungtsau in Chinese and Tsūsō in Japanese). The Chinese cut out of the snow-white pith of Fatsia papyrifera Miq. thin strips like paper with such extraordinary skill that, from a cylindrical piece of pith about 3 cm. in diameter and 6 cm. long, they can make a strip about 5 m. long with one continuous cut starting from the surface and parallel to the axis. The dry strips of pith paper are then dyed various colors and worked into beautiful artificial flowers for the coiffure. To call this pith paper "rice paper" is no less wrong than to use the name "rice broom" or "root broom" for articles made from the panicles of the durra (sorghum vulgare).

9: Yamasaki--232-233 N-5 (1896-1897) 1900 Formosans 116, 137, 314

Camphor (Chang-nau or Nau in Chinese, Shōnō in Japanese) plays the most important part among the forest products, in fact the island is the largest provider of it. The camphor tree (Cinnamomum camphora Nees.) or, as one also says, the "king of the Formosan forests," is found in abundance in the luxuriant virgin forests of the northern half of the Kali chain and the neighboring regions of the Central Range, up to a height of 2,000 m. The trees attain an imposing height and sometimes, [233] with a diameter of 3 m., are between 40 and 50 m. high.

26: Honda--469 [2] N-3 (1896) 1897 Formosans-1-2
116, 122, 137

... I felt an urge to explore the hitherto unknown mountainous part of the island of Formosa. In the fall of last year the Imperial Government finally asked me to make a study of the forestry of that region. I departed at the beginning of October, 1896, and after seven days I landed in Kelung, the northernmost port of the island; we had briefly stopped at the Liukiu Islands in the course of our voyage. Together with four companions I set out on my march through the western slopes of the almost central mountain chain; we were headed south. Beautiful evergreen woods - ficus and palm trees, camphor trees, bamboos, fig trees, pineapple, banana trees and cinnamon trees - covered the western spurs of the mountains where several Chinese villages are still found. Towards the east, however, in the direction of the mountain ridge the population is exclusively native. As the elevation increases, the vegetation changes. The tropical appearance is lost and Crypto-meriae, pine-trees, and firs are reminiscent of the temperate zone. Fortunately the Chinese have not yet deeply penetrated into the mountain regions, for they certainly do not know any such thing as consideration of the forest. Wherever they go war is made on the forest with fire. The Chinese inhabit bare plains where nothing but bamboo groves are visible; they are planted close to the dwellings. Incalculable damage has already been done by barbaric devastation. After a journey of ten days we arrived in Ling-ki-ho, a place inhabited by Chinese where I encountered the last Japanese guards. From here on to Mt. Morrison there are no Chinese settlements. I

116, 122, 137

was unable to find horses anywhere although I needed them badly, nor were mules or donkeys available.

On the first day (November 13) we advanced from Ling-ki-ho 24 kilometers toward Mt. Morrison through hilly or cultivated land. On the second day we marched on through grass three meters in height or through bamboo woods which in the valleys were replaced by banana woods. As we climbed higher, we soon reached the evergreen foliaceous woods. In the past they had apparently occupied areas now claimed by bamboos and banana trees. But the leafy woods could not maintain themselves when they were attacked by fire, and thus had to give way to the bamboos. In places where the bamboo forests were frequently subjected to fire, vegetation is limited to the bothersome kaya grass (Imperata arundinacea, Cyr.). In the foliaceous woods most of the trees are fig or camphor trees occupying large areas in many instances and mixed with palm trees and creepers. Here the vegetation is extremely luxuriant. The camphor trees reach a circumference of up to ten meters and a height of 50 meters. Ferns twenty meters high fight their way up between the trees, giant aerial roots hang down, and often we were at a complete loss facing the impenetrable confusion of the thicket. This virgin forest detained us for two days. I noticed that unfortunately many of the huge camphor trees had been hacked at by men in search for camphor and that they had died as a consequence of this treatment. As a result many of the giant trees had fallen or had been blown over by the wind. Only about five percent of a tree had been used for the exploitation of camphor and then thousands of trunks of precious wood had simply been left to rot. Of

course we immediately tried to stop such devastation and waste by strict regulations, but so far we have not yet the necessary personnel to create order in these dangerous parts of the country. In many cases the dead giants of the forest necessitated detours and we lost much time. We spent the second night in a lonely hut that must have been erected by camphor collectors.

On the following day [EJ: of the journey toward Mt. Morrison] we marched for six hours to the village of Tom-bū. Our route was along a stream with steep banks; there were no paths or bridges and at times the water reached up to our stomachs. Tom-bū was the last human settlement. Here we had to pick up new provisions. We were able to get some chickens, sweet potatoes, and millet. We left behind a number of porters and all luggage that was not absolutely essential. With four aborigines, who knew the entire region well, we started the actual ascent of Mt. Morrison. After three hours and at an altitude of 5500 feet we found a hot spring on the bank of the river; the temperature of the water was 70° centigrade. Some similar hot springs gushed forth in the stream itself.

Up to this point large evergreen foliaceous woods prevail. But wherever the natives have burnt down the high grass the vegetation is limited to cork trees (Quercus variabilis Bl.), which indeed occupy large areas. [472] From here on we encountered coniferous woods; at an elevation of 6000 feet, they comprised giant Chamacypariae and Crypto-meriae, their trunks having a diameter from six to ten feet. At 7000 feet we reached the zone of splendid fir trees; some of the species had hitherto been unknown to me. The preceding two days of our march had been very strenuous because most of the time we had to wade through the water of a brook flowing between steep banks.

In the morning of the eighth day after a difficult ascent over barren slopes we reached

a grassy area at an altitude of 9500 feet; it sloped slightly to the south, measured several English square miles and constituted a watershed. The peak of Mt. Morrison ro[illegible] before us in all its majesty. We made a big fire and spent the cool evening in a little valley. At 2 a.m., when the temperature was down to -3° centigrade, we started the final ascent. First we advanced on the north through Tsuga woods and then on the less steep south side with its pine forests; at times we were crossing grassy areas and finally moved along the high ridge itself; this ridge is crowned by several peaks and is covered with sharp rock fragments of argillaceous schists. We reached the summit at eleven o'clock; the cloudless sky allowed us the most splendid view over almost all of Formosa. Far in the east beyond numerous mountain peaks the ocean was visible. And once more the ocean appeared in the west at an even greater distance. We could see the villages of Taiwanfu in the west, and Tainan, Anping, and Takao in the south.

We took some photographs and finished our scientific observations when fog and strong winds forced us to start back. It was dark when we reached our base where we had left behind our luggage, the porters and our companions who had come down with fevers.

We did not have time to hunt deer or wild boars.... Some rain had fallen in the evening, and the water froze during the night so that we suffered a good deal as we were sleeping outside. The next morning all the Japanese had fevers; my temperature was up to 41.5°

centigrade and one of our native guides carried me on his back during the following three days. For this service I rewarded him with an old pair of pants since he had no use whatsoever for money.

I wish to stress the following points of our scientific observations:

1. The common notion that Mt. Morrison is of volcanic origin is erroneous. The main rock materials of the mountain and its environment are argillaceous schists and quartzite. The beds of the former strike with a dip of 70° from EN 10° to WS 10°. Therefore the northern slopes are much steeper than the southern slopes, and rock slides are frequent.

2. The height of the peak is not 12830 feet, as had been determined by means of trigonometric measurements from the sea, but our barometric observations showed that the height should be 14350 feet. It is likely that the peak itself, as seen from the ocean, may be hidden by another summit close to it.

3. At noon of November 21, our barometer stood at 453 mm and the thermometer at 4.5° centigrade with a relative humidity of 90%.

4. We did not find snow anywhere, not even in the rock fissures on the mountain. The notion prevalent among the Chinese of Formosa that eternal snow covers the mountain is due to the white quartz which from a great distance may be mistaken for snow.

5. The mountainland of Formosa by no means everywhere [473] consists of impenetrable virgin forest. The southern slopes of the mountains are often covered with extensive grass areas for which, in part, the fires started by the natives to facilitate hunting are responsible. Through the telescope from the peak, we have observed a good

deal of the mountain region, and have found that at the most forty per cent of the area visible from that position was occupied by forests.

6. Up to an altitude of 1700 feet, the lowland of Formosa is claimed by tropical vegetation among which ficus, pandanus, palm trees, and pineapple are predominant. From here to an elevation of 6000 feet above sea-level, we find sub-tropical evergreen foliaceous woods; camphor trees occur up to 6500 feet and the same is true of evergreen oak trees. At 6000 feet the region of coniferous trees begins; the species found are at first Cryptomeriae and Chamaesyparis then followed at 7000-8500 feet by firs (variety of Picea Glehni), and Tsuga diversifolia Maxim. at 8500-10, 500 feet. Finally from 10, 500 feet to the peak of Mt. Morrison, we find pine trees and juniperus and principally Abies Mariesti.

7. The abundance of water in the mountain lakes makes it possible to follow the watercourses into the region of the fir trees and the wood may be transported down the streams.

8. The exploitation of camphor on Formosa is still at a very primitive stage. If the methods of Kiushiu were employed production could easily be doubled.

9. The aborigines are by no means hunters. Only the chiefs and a few of their subjects go hunting. The main occupation of the people is agriculture. In particular,

sweet potatoes and millet are important products. In addition tobacco and a variety of pea are grown. The system of agriculture is communistic. Its advantages are that nothing is stolen because nobody is permitted to have private property. Both work and harvest are arranged on a cooperative basis.

10. The men are willing workers and like to use axes, which makes me believe that they would be good forestry workers.

31: Hofmann--612-613 N-3 (1909) 1912 Formosans
116, 137, 311, 499, 563, 177.31 Japanese
636.31

The pigtail which to us symbolizes Chinese traditions, in the cities exerts its rule in the literal as well as the figurative sense, it is a rule which cannot be stamped out. Chinese and Japanese are separated from each other by a difference in culture and beliefs which cannot be reconciled with each other. On the whole the Chinese element predominates and numerically they are so far superior that an amalgamation between the rulers and the subjects in the near future seems out of the question. The Japanese farmers, merchants, and small business men cannot compete with the Chinese; the Chinese are an astute people and they are moreover, better adapted to the [613] climatic conditions on this island. This is another motive for the Japanese to exploit the interior and to penetrate still further into the regions of the aborigines; here they plan to set up business enterprises on a large scale, but for this again they must use cheap Chinese labor. One of these enterprises is the construction of a railroad in the mountains so that the large forested regions in the vicinity of the Niitakayama (cf. Fig. 2, Mount Morrison) may be exploited. The forests are called the Arisan Forest; they have played an important role in Japanese politics during the last few years. The Fujita Company had acquired a concession for timber here; the government had to buy this land again from the company, which had already begun to build a railway, so that the price which had to be payed in all amounted to about two million yen, a sum which had to be granted by the Japanese Diet.

31: Hofmann--613-614 N-3 (1909) 1912 Formosans
116, 137, 245, 283

From Kagi we went to Chikutoki; on that stretch the land is level and the railway has already been completed. This region was also still dry, and the natives had not yet tended the fields. A feature characteristic of tropical vegetation is the abundance of palm groves (betel palms); the trees have an average height of seven to eight meters. The Chinese and Malayans chew betel nuts as a stimulant. The vegetation in the river-beds, most of which are dry at this time of the year, is more copious. The plant most frequently found, which is also cultivated artificially, is the large Nephelium longana (called Ryugan by the Chinese and Japanese) the fruits of which are very tasty. There are also large, old Ficus trees, including several varieties of palm trees (Phoenix humilis), Passiflora (Carica Papaya), Anona squamosa, etc; all these are representative of tropical flora. On the barren slopes there are Pandanus tectorius with leaves like pineapple trees; this furnishes a fiber which is used for hats resembling panama hats. The flora on the whole is rich in textile, especially fibrous plants. There are, first of all, the rattan palms with prickly leaves. The tough fiber of this palm is an excellent substitute for hemp and is used for all sorts of household utensils everywhere on Formosa. I did not see artificial plantations of this palm anywhere, however, [614] the Chamaerops excelsa is planted everywhere by the Chinese as a textile plant. The Liquidambar formosana is also planted artificially in this region; the leaves are used as feed for silkworms and the Japanese government expects to develop a successful industry of this plant.

From Chikutoki we started to ascend the mountain; where the ground was fairly level we used sedan chairs made of two bamboo poles in which we sat in a half squatting, half lying position. Four strong Chinese were able to carry my weight, 78 kilograms, with no difficulty. They were able to climb ascents of 20 to 30 at the same steady pace. The carriers in back change about every fifteen minutes.

After an ascent of about five hours, at a height of about 600 to 700 meters, we found that the landscape had changed considerably. We went through bamboo forests, more dense and more extensive perhaps than anywhere else on the Japanese islands; forests like these are not found, so far as is known, anywhere else on Formosa. In an area of about 10,000 hectares the vegetation consists entirely of bamboo trees; these grow so close together that there is no space for other plants to develop. The average height of the bamboo trees is not more than 13 meters. Whether these bamboo forests represent the original vegetation or whether they have taken the place of leafy trees which were destroyed by a forest fire cannot be determined. The fact that they are spread over a large area supports the assumption that the vegetation is original and has a xerophilous character. The forests of bamboo trees grow on dry, low elevations composed of sandstone which are exposed to the sun; at the level at which they grow there are dry and rainy seasons. At a height of about 1,000 meters there are rainfalls of short duration with an intensity characteristic of the tropics almost every day; at this level bamboo trees no longer predominate. Chinese settlers have penetrated as far as the bamboo

forests, however, and from this it might be concluded that the original jungles were destroyed by the fires of the colonists [615] and that new shoots of bamboo took their place by a natural process. This has happened several times on the Japanese islands. On the other hand the settlements are sparse and do not penetrate very deeply into the region of the bamboo forests. The numerous places where trees have been burned down, which are also found in the sections entirely inhabited by the aborigines, are overgrown with stiff, tall reed plants, Imperata and Miscanthus which because of their dense growth prevent the growth of trees at least for the near future. It is well known that bamboo trees grow to their full height within one year. Since it has many uses, bamboo often takes the place of timber; for that reason the Chinese exploit the forests around their settlements since for their purposes bamboo alone is sufficient.

On the following day we advanced [EJ: from Karapen] about 18 kilometers and reached an altitude of approximately 1,400 meters. When we had reached our destination, a point which the Japanese had called Funkiko and which was to form the end station of the [616] future railway, the thermometer stood at 19° Celsius and the aneroid at 1,420 (corrected at sea level). Our way took us through depressions and over elevations. The mountains, which consist of schist, are broken up into numerous steep and narrow ranges. Here and there sandstone lies exposed; in most places, however, the ground is completely covered with vegetation. In the northeast the Tauzan (Devil's Mountain) drops down abruptly. This is an isolated limestone mountain with barren slopes; it has a height of 2,800 meters. Here the vegetation is entirely different from that we encountered on the previous day. Before we entered the subtropical forest of Lauraceae trees we were struck by the beautiful tree ferns (Fig. 3), which attain a height of 10 meters or more, and the large banana trees growing on the mountains (Musaceae) with their huge leaves. Both of these plants, in contrast to the dry bamboo forests, demand a high degree of moisture both in the soil and in the atmosphere while they cannot grow where there are strong air currents. On these elevations there is not even a breeze, which is all the more striking since the valley of Kagi, barely 20 kilometers distant in a direct line, is frequently ravaged by violent typhoons. Everywhere we saw banana leaves which were unharmed; these leaves would be easily torn if there were a strong wind. It is a remarkable fact that typhoons are limited to the lowest regions while above

an altitude of 100 meters they do not occur. Although tree ferns and Musaceae, which usually occur in groups, do not take up much space in a limited region and often grow between other trees in the forest, forests of fern and palm trees must be considered characteristic of Formosa. They form perhaps an example of Tertiary flora; according to a theory now accepted by geologists Tertiary flora; which demands a constantly humid, rainy and foggy climate which is at the same time warm and not windy, once predominated on the earth.

On the second day of our journey we again passed through beautiful Lauraceae forests; the most attractive scenes, however, were reserved for the third day, when we covered the distance from Funkiko to Goten (2, 220 meters). On that day we crossed two mountain ridges so that we could reach the plateau of the Arisan mountain [617] by the shortest possible route. The region between 1, 000 and 1, 800 M. is covered with foliaceous forests; here as everywhere else camphor trees grow only singly, while evergreen oaks, Quercus gilva, acuta, etc., predominate, as well as Pasania cuspidata. Cinnamonum pedunculatum, Machilus Thunbergii. All the foliacious trees here are evergreen. There are huge tree trunks overgrown with epiphytic plants; the tops of the trees form an almost impenetrable roof so that neither rain nor sun is admitted here. The average height is over 30 meters. In this hothouse atmosphere there are numerous lianas which grow to great heights and develop strong aërial roots the size of an arm; they are suspended from the tops of the trees on which they live.... The lower

arboreal flora has its habitat among the tree tops. There are large white orchids and ferns, and on the long branches of the crown and the sides of the Lauraceae trees there are groups of hart's tongues. All of these plants...are engaged in a continual struggle for light. Our coolies were very careful not to step into the shrubs along the paths, where a dangerous venomous snake with green coloring has its habitat.... The densest part of this forest is found in the depressions and on the lower slopes. In the higher regions the forest is less dense and there is more light for the plants to develop so that even those on the ground are not hindered in their growth. There are various types of shrubs, among which the Fatsia, with its large digital leaves is especially striking. Gradually the Lauraceae grow further and further apart and less tall. At an altitude of about 2,000 meters conifers begin to appear, first singly and gradually growing taller and more numerous. These consist of species of Chamaecyparis; the evergreen foliaceous trees take the place of underbrush while these predominate. [618] After the gigantic proportions of the jungle through which we had just passed we did not immediately become aware of the size of these trees, which have stood for so many centuries. It was not until we took measurements that we realized that these must be among the tallest trees anywhere in the old world. There are some which grow as tall as 60 meters. The largest of the Chamaecyparis formosensis have a diameter of six meters;

they are about 52 meters high and furnish 280 cubic meters of timber. (cf. Fig. 4). A single tree thus offers more timber than a hectare of old pines in central Europe.

The largest trees may be found in the vicinity of Goten, which is to be the end station of the railway, where the Japanese have already built several houses. Here there is a wide, almost level depression with a deep layer of humus which is protected from the wind on all sides; this is an ideal habitat for the conifers, and the trees here are probably as large as those in California. Since 1907 a meteorological station has been set up in Goten...

We spent several days exploring the jungle area around the Arisan, an area comprising 10,000 hectares in all. At a level of 2,400 meters and above the Cupressi predominate. Here the trees do not attain the heights quoted above, but the average height is over 40 meters and the forest is so dense that one cannot see more than a few feet away. One elevation, which has been named Manzaisan, has an altitude of 2,670 meters and is overgrown with reeds; from here one has a good view of the surrounding mountains. There is a thick fog below so that we cannot see the route we had taken the previous day; in front of us, however, lies the imposing peak of Mount Morrison, which, according to the aneroid, has a height of 4,340 meters. The highest point visited by us in this region was the peak of the limestone mountain, Teufelsberg, with an altitude of 2,800 meters. Here the view is obscured by the dense forests.

The bay and lagoon of Takao offer a beautiful sight. The lagoon is connected with the ocean by a narrow opening, hemmed in by coral reefs; large boats therefore cannot enter the bay. Work on harbor installations is still in progress; this is an ambitious and costly project, but it is a necessary step in establishing communication with the south. It will also be necessary to make the harbor safe, especially since the roadstead of Takao offers no protection even to large steamers during the frequent and violent typhoons. The most dangerous months for typhoons are June, July, and August. The direction of the wind, which may develop a velocity of 100 miles per hour, is from east to west. For those harbor installations which are made of wood, the Teredo navalis is extremely destructive. Pine wood may be destroyed by these worms within three months, while Chamaecyparis wood may last for one year. Timber which is used for buildings on land (for railways, telegraph poles, etc.) is destroyed by white termites, but if the wood is impregnated with tar, this forms a sufficint, though costly, protection. The bay within the lagoon is about 22 kilometers long and 5 kilometers wide at its widest point. Around the bay there are artificial sea gardens. Among the plants growing wild there are first of all pandanus groves, which probably form one of the most unusual features in the vegetation of Formosa; while in other regions of the island pandanus grows only in the form of shrubs here it is tree-like and forms a plant typical of coastal regions.

Another unusual form of vegetation of a purely xerophilous character is a species of

tropical Euphorbia Tirucalli (spurge); here it has hardly any leaves, since their place is taken by green branches. Its habitat is among the rocks on the beach, and it may grow as high as ten meters. [629] Finally, there are several species of mangrove along the level coast of the lagoon of Takao.

/34 In areas above 9,800 feet elevation podsols (generally associated with coniferous forest cover) and slightly podsolized alpine soils are found. Grey-brown and yellow podsolic soils are found on the mountain slopes between 6,500 and 8,500 feet. In the foothill areas less than 6,000 feet above sea level, lateritic soils -- yellow, light red, and deep red, depending upon the altitude at which they are found -- constitute a major part of the soil.

Alluvial soils, important for agricultural use, cover an area of about 3,300 square miles, or 24 per cent of the island's surface, and are found principally in the southwestern part of the island. Small tracts of alluvial parent materials are widely scattered throughout lowland Formosa. In the middle and northern plains are generally acid alluvial soils; alkaline alluvial soils spread over the southern plains, Taitung Trench, and Yilan Plain.

V. VEGETATION

•/37 Most of the mountains are heavily forested. About 68 per cent of the main island is covered with three dominant plant formations -- broad-leaved evergreen forests, mixed forests of broad-leaved deciduous trees and conifers, and coniferous forests. Two minor types of vegetation are seen on the foothills,

137 the relatively small bamboo forest along the western foothills and steppe, and shrubs over the low slopes of the mountains.

VI. CLIMATE

132 Latitude, ocean currents, topographic features, and of most importance, the monsoons determine the climate of Formosa.

Generally speaking, the main island is semi-tropical. It separates, at its southern end, the Kuro-shio (ocean current) which flows northward, and lies within the great Asian monsoon system which provides strong northeast winds in winter and less pronounced southwest winds in summer. The result is that the island is windy and has generally high temperature and precipitation. However, dry winters are experienced in the southern plains.

The warm and humid summer lasts from May until September, the mild winter from December until February. The highest temperature rarely exceeds 100°F in the hottest summer months, July and August; the lowest has never been below 35° F in the coldest month of January.

Average annual rainfall ranges from 50 inches on the low eastern coast to 250 inches